

**A COMMUNITY'S RESPONSE TO INFANT MORTALITY:
FORSYTH COUNTY, NORTH CAROLINA**

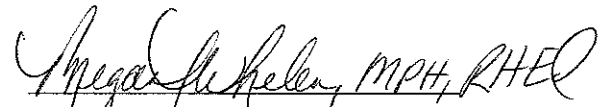
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ABSTRACT

JOANNE GAIL GONWA: A Community's Response to Infant Mortality:
Forsyth County, North Carolina
(Under the direction of Lori Evarts)

Disparities in infant mortality health rates are a persistent problem in today's world. Infant mortality rates within the United States do not compare favorably with similar industrialized nations worldwide. Efforts to reduce infant mortality rates in the United States have shown some progress yet have failed to significantly impact the disparities in infant mortality among ethnic/racial groups.

Forsyth County, North Carolina has made a comprehensive community wide effort to address these disparities in infant mortality. This paper purposes to examine the root causes of infant mortality within Forsyth County, describe the efforts to reduce overall infant mortality within the county, and explore further solutions to this continuing health problem.

ACKNOWLEDGEMENTS

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JAZELLE'S STORY

Jazelle's story is not difficult to understand and, if understood, the events of her life become predictable. At age sixteen Jazelle had just given birth to her first child at 28 weeks gestation. Her mother had two children by the time she was Jazelle's age. Jazelle herself was born early. Her mother worked long hours when she could and when she was not working she was too tired to devote much attention to her growing daughter. Her grandmother was around more but not much more attentive. Jazelle liked school as a young child yet the academic promise Jazelle displayed in her early elementary school years was never nurtured. Her mother never completed high school. Attending school is of secondary importance when you are a young adolescent mother.

Although surrounded by others, Jazelle was left to fend for herself. Much of what she knew about life she learned from her siblings and peers. Her father was around in the community but never a constant presence in her life. When he did come around he fought with her mother, often physically. Consequently, Jazelle was both drawn to, and intimidated by men. It was much the same with the father of her baby; he was around sporadically yet she could not count on him to be there when she needed him. Jazelle learned to accept that having children at any early age is a rite of passage into womanhood.

Things were rough at home and she often heard her mother complain about having so many mouths to feed. Consequently Jazelle hid her pregnancy from her mother as long as she could. Jazelle was in her third trimester when she saw the obstetrician for the first time. The doctor and nurses at the clinic gave her a lot of information; actually too much information for her to absorb. Jazelle did the best she could for herself and her unborn child. The doctor and nurse suggested she stop smoking and eat better but smoking calmed her down and she

could only eat the foods that were available at home. She didn't particularly like using marijuana but she missed her boyfriend and when she was with him she did what she had to do to prolong the time she spent with him. He did have a point when he said using helped numb the pain. Jazelle was ok with being pregnant at age sixteen, after all, her mother was less than her age when she was born and she needed someone to love. She could recall the words to the Preamble of the Constitution that "all men were created equal" and had the same rights but these words were a far cry from her own expectations and her expectation for her newborn. Although Jazelle's story is for illustrative purposes; daily in the United States a teenager gives birth every minute (March of Dimes, 2008).

DEFINITION OF INFANT MORTALITY

The Centers for Disease Control and Prevention (CDC) defines infant mortality as the death of an infant before one year of age. Neonatal mortality occurs between birth and age 28 days. Postnatal mortality occurs between age 28 days and one year. Infant mortality rate, defined as the number of babies less than one year of age who die divided by the number of babies born alive per population, is a standard indicator of population health (CDC, 2009). Infant mortality is also a sentinel indicator of child health and well being over time which impacts community viability. The most striking socioeconomic inequalities in neonatal survival are seen when viewed from a global perspective with 98% of neonatal deaths occurring in less developed countries (Gray & McCormick, 2009). Infant mortality risk factors in the United States include preterm birth, low birth weight, birth defects, late access to prenatal care, teen pregnancy, tobacco use, alcohol use, drug use, racism, stress and poverty (Healthy Carolinians, 2010). Both prematurity and infant mortality are associated

with socioeconomic position, with risks being greater in those from the most deprived socioeconomic groups.

INFANT MORTALITY IN THE UNITED STATES

The United States spends 16% of its gross national product on healthcare which is more than any other nation in the world, yet infant mortality rates in the United States lag behind many comparable industrialized nations (Williams & Torrens, 2008). In 2005, the United States ranked 30th in the world in infant mortality which was behind most European countries (CDC, 2005). In high income countries such as the United States, large overall reductions in infant deaths have been associated with greater use of obstetric interventions leading to increased survival as opposed to a reduction in the underlying socio-economic inequalities that contribute to infant mortality (Gray & McCormick, 2009). In fact, African-American infants born in the United States are twice as likely to die as white infants before their first birthday (The Office of Minority Health, n.d.) and effective obstetrical interventions and access to health care do not equate to a reduction in health disparities.

According to Peristats Data compiled by the March of Dimes (MOD) on an average day in the United States 11,686 babies are born. 1,487 (13%) of these babies are born preterm (less than 37 weeks gestation) and 374 (3%) of these births occur very preterm (prior to 32 weeks gestation). Of these preterm births, 964 (52%) of these infants weigh less than 5.5 pounds and 173 (9%) weigh less than 3.5 pounds. One in every eight infants is born prematurely in the United States and this rate has continued to rise over time. Premature infants are 15 times more likely to die during the first year of life than those not born preterm. On average, 76 of the infants born each day in the United States will die before reaching their first birthday (MOD, 2010). Children born prematurely are at a greater risk for

long term physical and mental disabilities, lower cognitive test scores, and behavioral problems (Institute of Medicine, 2006).

DISPARITIES IN INFANT MORTALITY

The elimination of racial and ethnic disparities in health outcomes is a goal of the United States Public Health Policy. In 2007, 30% of adults and 40% of children in the United States belonged to racial or ethnic minority populations (CDC, 2008). Nearly half of African-American infant deaths are due to prematurity as compared to 28% of deaths among Caucasian infants (Kitsantas & Gaffney, 2008). In 2004, 18% of infants born to non-Hispanic black mothers were preterm as compared to 11% of infants born to non-Hispanic white mothers. Prematurity/low birth weight is the second leading cause of infant mortality and the leading cause of African-American infant death. Large declines in infant and post-neonatal mortality among higher socioeconomic groups have contributed to the widening gap in infant mortality since 1985 (Maternal and Child Health Bureau, 2006). Racial, ethnic, and geographic disparities persist among infant mortality outcomes in the United States despite targeted health care interventions.

The infant mortality rate is highest in the south eastern portion of the United States ranking 7.8 per 1000 births (MOD, 2010). Infant mortality rates are higher in counties with greater of socioeconomic disadvantages including poverty, lower maternal education, and environmental risks (Sparks, et. al, 2009). The US Department of Health and Human Services in its Healthy People 2010 statement places a high priority on the elimination of health disparities. Healthy People 2010 goals to improve birth outcomes include 1) reduction in rates of infant and maternal mortality, preterm and low birth weight births and birth defects, 2) increase the proportion of women receiving early and adequate prenatal care, and

3) ensure appropriate newborn screening and follow-up testing and care (Healthy People 2010, n.d.). Inadequate or lack of prenatal care is associated with a greater risk for neonatal mortality in all ethnic groups (Kitsantas & Gaffney, 2010). African American and Hispanic mothers are less likely to receive timely prenatal care than other expectant mothers and one in three teen mothers ages 15 to 19 receive no first trimester prenatal care (Annie E. Casey Foundation, 2008).

Prematurity and birth defects account for the majority of infant deaths within the first year of life in the United States. For the past 20 years birth defects have been the cause of death for one out of every five infants during their first year of life making this the leading cause of infant mortality (MOD, 2010). Birth defects of the heart and circulatory system are most common. Prematurity/low birth weight is the most common cause of neonatal mortality. In 2006, 540,000 babies were born prematurely in the United States (MOD, 2010). These babies are 75 times more likely to die before their first birthday than those born at term (National Center for Health Statistics, 2004).

Table 1. Infant deaths and mortality rates for the top three leading cause of death for African-Americans, 2005

Cause of Death (By rank)	Rates per 100,000 live births				
	# African American Deaths	African American Death Rate	#Non- Hispanic White Deaths	Non- Hispanic White Death Rate	African American/ Non- Hispanic White Ratio
(1) Low-Birthweight	1,780	304.9	1,725	75.7	4.0
(2) Congenital malformations	978	167.5	2,851	125.0	1.3
(3) Maternal Complications	619	106.0	734	32.2	3.3
(4) Sudden infant death syndrome (SIDS)	580	99.4	1,264	55.4	1.8

Source: CDC 2008. Infant Mortality Statistics from the 2005 Period Linked Birth/Infant Death Data Set. *National Vital Statistics Reports* 57(2). Table 7.

The leading causes of infant mortality vary by race. Birth defects were the leading cause of infant mortality among non-Hispanic white infants in 2005. Among African American infants the leading cause of infant mortality was prematurity/low birth weight (CDC, 2008). African American mothers give birth to a higher percentage of premature infants than other races. Research has shown that low birth weight and prematurity among blacks may be mediated by socioeconomic status, insurance, neighborhood efforts, maternal stress, social support, racism, and exposure to violence and adverse maternal health experiences (Howell, 2008). Although birth weight is thought to be a significant factor explaining the infant mortality disparities between blacks and whites there are studies that suggest that after controlling for birth weight, black race is associated with lower mortality (Howell, 2008). Maternal factors such as age less than 18 years or greater than 40 years, pre-pregnancy weight, history of preterm births, and certain lifestyle behaviors such as smoking, alcohol consumption, and cocaine use are additional risk factors for preterm delivery among all ethnic groups (Howell, 2008).

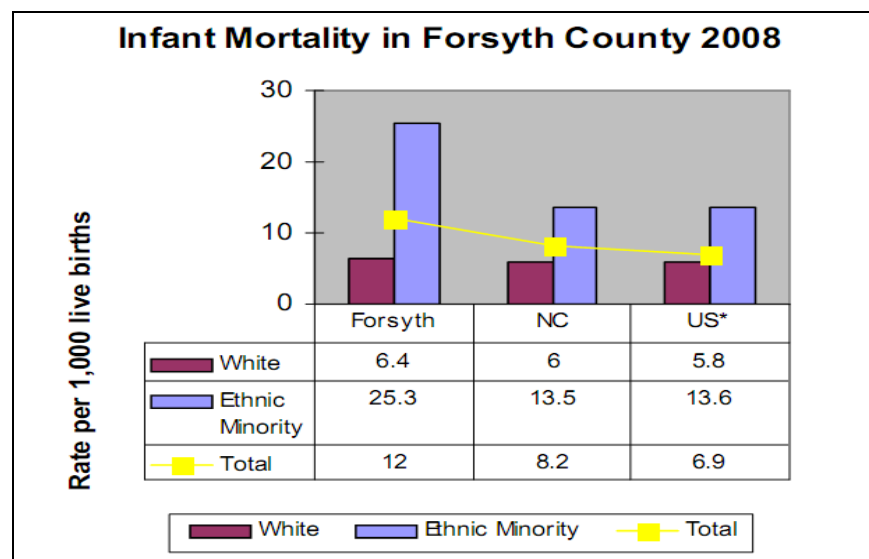
INFANT MORTALITY IN FORSYTH COUNTY

North Carolina ranks 44th in the country for infant mortality, with an average infant mortality rate of 8.6 deaths per 1,000 live births between the years of 2003 and 2005 (MOD, 2010). In 2008, there were 1,066 infant deaths in North Carolina; 680 (64%) of these infant deaths occurred in the neonatal period and 386 (36%) deaths occurred postnatally (State Centers for Health Statistics, 2008). Additionally, 11,929 low birth weight babies were born in 2008 in the state (State Centers for Health Statistics, 2008). Estimates have been made that average first year medical costs for babies born with characteristics of low birth weight

and/or preterm are nearly ten times as costly compared to the first year medical costs for babies born at term (MOD, 2010).

Forsyth County lies nestled at the foothills of the Piedmont section of North Carolina and is one of the five largest counties in the state. Forsyth County's population is 66% white, 25.6% black, and 6.4% Hispanic (City-Data, n.d.). The county median household income in 2008 was \$46,812 and 15.3% of the population lived in poverty (City-Data, n.d.). There were 57 Forsyth County infant deaths in 2007. (The ethnic minority infant death rate is 25.3% compared to a 6.4% white infant death rate (North Carolina State Center for Health Statistics, 2009)). Forsyth County infant mortality statistics represent an extreme racial disparity that is much more pronounced than the North Carolinian and national rates. Non-white North Carolinian infants died at nearly 4 times the rate of white infants in 2008 (Forsyth County Infant Mortality Reduction Coalition [FCIMRC], 2009).

Table 2. Infant Mortality in Forsyth County 2008



Source: FCIMRC report Infant Death in Our Community, Dec. 2009

Seventy-five percent of Forsyth County infant deaths in 2008 under one month of age were due to premature birth and problems associated with prematurity (Forsyth County Report, 2009). Sudden Infant Death Syndrome is the leading cause of death for infants between one month of age and one year in Forsyth County (FCIMRC, 2009).

MATERNAL AGE

Infant mortality rates vary with maternal age, and maternal age is a factor in premature births. In 2004, 16% of infants born to women aged 17 years and younger or 40 years of age and older were born prematurely (National Center for Health Statistics, 2004). A mother's health prior to conception can have a profound effect on birth outcomes among young mothers. In older mothers the risk of birth defects rises. (MacDorman & Matthews, 2008).

MATERNAL PRE-CONCEPTION HEALTH

Maternal health is associated with infant mortality. In North Carolina over one-third of all fetal deaths are associated with risks attributed primarily to maternal health and for African American births, almost half of infant deaths are related to maternal health (State Infant Mortality Collaborative, 2007). Women of reproductive age who responded to a 2003 Pregnancy Risk Assessment Monitoring System (PRAMS) North Carolina data collection survey revealed that 24.4% of women smoked, 28% of women of reproductive age in North Carolina had not participated in any form of physical activity over the previous 2 years, 13% had not had a recent pap smear, 20% were uninsured, 45% of all births were unplanned, and the Chlamydia rate was 617.9 per 10,000. The obesity epidemic within the United States is has impacted women of child bearing age. In North Carolina over fifty percent of expectant

mothers are overweight or obese. Maternal obesity may adversely affect pregnancy by increasing the risk for chronic hypertension, diabetes, cesarean sections, and infections. Maternal obesity increases the risk for birth defects including neural tube defects, heart defects and is a contributing factor to development of obesity during infancy (University of North Carolina Center for Maternal & Infant Health, 2009).

Women who consume at least 400 micrograms of folic acid daily - prior to conception and during the first trimester of pregnancy - have a 70% reduction in risk of neural tube defects in their offspring (MOD, 2010). The benefits of folic acid extend to reduction in congenital heart defects, reduction of cleft lips, pediatric neuroblastomas, leukemia and pediatric brain tumors, and preeclampsia (Jones & Moldenhauer, 2009). These birth defects occur early in pregnancy, often before a woman knows she is expecting.

The Centers for Disease Control and Prevention (CDC) uses PRAMS to monitor maternal and infant health. Data collected from women in North Carolina highlight the following modifiable risk factors: tobacco use, alcohol use, lack of contraception, low compliance with prenatal vitamin administration, obesity, violence in relationships, and prior poor birth outcomes. Further, 18.2% of North Carolinian respondents identified significant stress in their lives (Cotton et al., 2009).

Addressing maternal health problems that contribute to infant mortality in mothers with the greatest risk of poor pregnancy outcomes prior to conception is a current focus of experts and researchers. North Carolina has a long standing commitment to preconception health through promotion of programs that help women modify behaviors and navigate situations that put them at risk. Examples of health promotion programs include smoking cessation classes held at health departments, counseling services available to promote healthy

interpersonal relationships, and a state initiative administered by the MOD to provide folic acid to women at risk for nutritional deficits.

ACCESS TO AND UTILIZATION OF PRENATAL CARE

According to the MOD, 83.9% of women in 2004 received prenatal care. Infants whose mothers receive prenatal care in the first trimester have better birth outcomes than those whose mothers do not receive prenatal care. Early prenatal care can identify maternal problems that could negatively impact pregnancy outcomes such as chronic disease, infection, or nutritional deficits. Additionally, prenatal care may include emphasis on smoking cessation, encourage breast feeding, and provide mothers with a link to community support services. Comprehensive prenatal care that includes nutrition education, social support, and health education services has been shown to be effective in reducing low birth weight and very low birth weight infant deliveries (Dolfus et.al. 1990). Estimates have been made that over 50% of infant deaths might be prevented if prenatal and perinatal care that is high in quality, appropriate in content, and both available and accessible were adequate to meet the needs of all ethnic groups in our nation (Dolfus et.al, 1990).

POVERTY

Poverty is a contributing factor to poor health outcomes across the lifespan. Further, poverty is associated with inadequate nutrition, substandard housing, exposure to environmental hazards, unhealthy lifestyle behaviors (such as obesity and substance abuse), and decreased access and use of health services; all of which contribute to increased stress (CDC, 2008). Pregnant women experiencing stress are at risk of producing stress related hormones that may contribute to preterm labor. Women living with high stress and/or anxiety

levels may be more likely to deliver a low birth weight baby even if carried to term (FCIMRC, 2009). In 2006, 27-33% of Hispanic and Black children were poor compared to 10-12% of non-Hispanic white and Asian children in the United States (CDC 2008). Twenty-eight percent of all children under the age of 18 lived in a single parent household in 2006 (CDC, 2008). Statistics have shown that children in single parent households, especially if that parent is the mother, are financially disadvantaged and have poorer physical and mental health than children living with two biological parents. Fifty-six percent of black children, 29% of Hispanic children, and 23% of white children lived in single parent homes in 2006 (CDC, 2008).

SMOKING AND SUBSTANCE ABUSE

Smoking during pregnancy contributes to an elevated risk of miscarriage, premature birth and lower birth weights (CDC, 2008). On average infants born to women who smoke weigh 200 grams less than non-smoker's babies (MOD, 2008). In 2006, 7.9% of African American mothers smoked as compared to 13.3% of non-Hispanic white mothers in the United States (CDC, 2009). Educational level is associated with smoking. Adults with less than a high school education are 3 times more likely to smoke than those with a Bachelor's degree or more education (Matthews, 2001). Smoking rates have declined among all educational groups with the greatest decrease among women with a higher education. Infants born to smokers are more likely to die during the postnatal period than infants born to non-smokers (Kitsantas & Gaffney, 2010). "It is estimated that if all women quit smoking while pregnant, a five percent reduction in infant mortality would be observed." (United States Department of Health and Human Services, 2004).

Alcohol and substance abuse are related to adverse birth outcomes. Close to 40,000 babies are born each year in the United States with Fetal Alcohol Spectrum Disorder (FASD) which is a term used to describe a wide variety of ill health effects caused by alcohol use during pregnancy (National Institute on Drug Abuse (NIDA), n.d). There is no cure for FASD and many babies exposed to alcohol in utero have lifetime health issues as a result. Over five percent of pregnant women reported using illicit drugs during the month preceding their response to a national survey of pregnant women conducted by the NIDA in 2007-2008 (Substance Abuse and Mental Health Services Administration, 2008). Children born to a substance abusing mother frequently have birth defects and growth deficiencies in conjunction with developmental problems (Healthy Carolinians, 2010). Further, substance abuse contributes to interpersonal violence.

MATERNAL EDUCATIONAL LEVEL

Maternal education is a predictor of infant survival. Key risk factors for infant mortality such as smoking during pregnancy, delayed or non-existent prenatal care, lack of health care coverage, nutritional status, and substance abuse vary with maternal education and socioeconomic status (Annie E. Casey Foundation, 2009). Postnatal mortality decreases with higher level of maternal education (Kitsantas & Gaffney, 2010). In their study of African American women, Din-Dzietham and Hetz-Picciotto found that achieving 12 years of education reduced the infant mortality rate by ten percent in both African American and white mothers. Education beyond 12 years further reduced this risk only among white mothers. Recent studies have shown that higher education appears ineffective in reducing African American infant mortality. In fact, it appears that disparities in infant mortality

between African American mothers and white mothers increase with higher levels of education (Din-Dzietham & Hetz-Picciotto, 1998).

INADEQUATE SOCIAL SUPPORT

Stress has been identified as a factor in preterm birth. People with strong support networks handle stress better, as social networks may mitigate the effects of stress. In a research study done by Miranda et al., low social support was identified as an independent risk for low birth weight or preterm birth. In this study, non-Hispanic black mothers were found to be at increased risks of poor birth outcomes due to neighborhood deprivations associated with low income and reduced social support (Miranda et al., 2009).

STRESS

Stress related to socioeconomic issues affects all ethnic groups. Research done by Merkin et al., has shown a strong inverse association between neighborhood socioeconomic status and biologic indicators of elevated risk (including serum levels of C-reactive protein, albumin, glycated hemoglobin, total and high-density lipoprotein cholesterol, waist to hip ratio, blood pressure and resting heart rate) in black subjects. These associations, while also present in Mexican Americans and whites, were weaker and less consistent (Merkin et al., 2009). Living in neighborhoods with low socioeconomic status in the United States produces a greater cumulative biologic risk profile among blacks.

Lifestyle choices of expectant mothers can have a profound effect on birth outcomes. Maternal lifestyle choices such as smoking, alcohol and substance abuse, dietary choices, sexual practices, and healthcare utilization impact maternal health and infant mortality.

Neighborhood influences may impact birth outcomes by shaping maternal risk factors in response to stress (Schempf & Strobino, 2009).

Stress due to racism appears to have an enhanced affect upon African Americans. A recent study conducted by Dominguez et.al examining the role of psychosocial stress in racial differences in birth outcomes among African American and non-Hispanic white women demonstrated that perceived racism and indicators of general stress were correlated with birth weight in African American pregnant women, but not in non-Hispanic white pregnant women. These findings were independent of medical and socio-demographic control variables leading the authors to conclude that racism may play an important role in birth outcome disparities (Dominguez et al., 2008).

FORSYTH COUNTY INFANT MORTALITY REDUCTION COALITION

The Forsyth County Infant Mortality Reduction Coalition (FCIMRC) is a partnership of organizations and individuals working together to address infant mortality in Forsyth County whose mission is “*To reduce infant mortality by educating the community about how to prevent infant death and advocating for systems and policy changes that support healthy birth outcomes*” (FCIMRC, 2009). FCIMRC is comprised of health department employees, educators in the community, representatives from the Winston-Salem/Forsyth County school system, maternal and child health service providers (such as Imprints for Families), the MOD, faith based organizations, physicians, and staff from area media outlets. FCIMRC sponsors the website www.HelpOurBabies.org, which educates the community on causes of infant death, ways to prevent infant mortality, risk factors for pregnant women, signs of preterm labor, and local resources to assist community members.

FCIMRC publishes the annual report *Infant Death in Our Community*. The December 2009 edition reported that North Carolina ranks 44th in the nation for infant deaths and Forsyth County's ethnic minority infant mortality rate is nearly double that of North Carolina's as a whole (25.3% ethnic minority infant mortality rate compared to 13.5% ethnic mortality rate for North Carolina). Prematurity and associated problems are the leading cause of infant mortality in Forsyth County for infants under one month of age. Sudden Infant Death Syndrome (SIDS) is the leading cause of postneonatal infant deaths. Efforts to reduce premature births especially among minority populations have up to this time been ineffective, as the Forsyth County infant mortality rates have remained virtually unchanged for the past decade.

MEDICAL HOME AND PRENATAL CARE

The FCIMR partnership promotes the concept of medical homes for county residents as defined by the Association of American Medical Colleges (AAMC) as “a concept of model of care delivery that includes an ongoing relationship between a provider and patient, around-the-clock access to medical consultation, respect for a patient's cultural and religious beliefs, and a comprehensive approach to coordination of care through providers and community services” (AAMC, 2008.). Through FCIMR, barriers to care are being addressed such as the extension of clinic operating hours to reduce inappropriate use of emergency room visits and promote utilization of medical homes (FCIMRC, n.d).

COMMUNITY HEALTH EDUCATION

The Forsyth County Health Department offers clinics to educate the community on issues such as family planning, HIV/STD counseling and testing, prenatal and parenting

classes. Pregnant teens are supported through programs such as the Baby Love Support Services of Forsyth County, Imprints for Expectant Families, and social worker placement for teen moms and their babies within the county school system. The Forsyth County Health Department also offers smoking cessation resources for pregnant women. Breastfeeding resources in the county include LaLeche League, Nursing Mother's Center, and Women Infants and Children Program located at the health department. The Forsyth County Schools use a health based education program that addresses the importance of eating a balanced diet, physical activity, and abstaining from tobacco and substance abuse (FCIMRC, n.d.).

17P CAMPAIGN TO PREVENT PRETERM BIRTH

Recent advocacy campaigns of the FCIMR include initiatives to reduce preterm delivery through utilization of the drug 17P among eligible expectant women and reduction of exposure to smoke through passage of the North Carolina Smoke-Free Law January 2, 2010 (FCIMRC, n.d.). At this point it is too early to tell what type of impact this legislation may have on smoking and preterm births in Forsyth County.

HEALTHY CORNER STORE INITIATIVE

The Healthy Corner Store Initiative was adopted by the FCIMRC in partnership with a local grocer to offer healthier food options and access to fresh fruits and vegetables in neighborhood convenience stores. The initiative includes door to door neighborhood surveys to talk with neighbors about barriers/opportunities to shop at a corner store and seek a commitment from neighbors and faith communities to shop at Corner Store (FCIMRC, n.d.). The Healthy Corner Store Initiative is modeled after the Corner Store programs that exist in several other major cities and is in keeping with a goal of the new government program

spearheaded by Michelle Obama, Let's Move, to eliminate "food deserts" in the United States within seven years (Lets Move, n.d.).

FOLIC ACID

FCIMRC has committed to promote the use of multivitamins with folic acid prior to and during pregnancy in conjunction with the MOD. Information is provided to women of child bearing age regarding the importance of taking a daily multivitamin with Folic Acid.

PRE-CONCEPTION/INTERCONCEPTION HEALTH

The CDC defines preconception care as "interventions aimed to identify and modify biomedical, behavioral, and social risks to a woman's health or pregnancy outcome through prevention and management, focusing on factors which must be acted on before conception or early in pregnancy to have maximal impact" (CDC, 2007). According to the CDC this includes a full scope of preventive and primary care services for women prior to their first pregnancy and continuing between pregnancies (interconception care). The 2010-2012 advocacy issue of the FCIMRC is Preconception/Interconception Health. Since close to half of all pregnancies in the United States are unplanned, it becomes imperative to ensure that women of child bearing age are in optimal health prior to conception (MOD, n.d). The Coalition will focus on these key issues: 1) financial security – living wage, 2) access to healthy foods, and 3) open access to preventive services and effective interventions for risk groups, 4) public awareness, and 5) reproductive life planning (FCIMRC, 2009).

FORSYTH COUNTY COMMUNITY EXPERTS

Dr. Robert Dillard, a Professor of Pediatrics at Wake Forest University School of Medicine, is a neonatologist with clinical specialties in infant mortality, neonatology, and neonatal outcomes. Dr. Dillard has worked for decades in Forsyth County to improve the birth outcomes for residents. In an interview exploring infant mortality in Forsyth County, Dr. Dillard offers unique insight into the county. Dr. Dillard notes that “the resilient disparities in infant mortality outcomes in Forsyth County are due to complex and inter-related societal issues” (R. Dillard, personal communication, January 26, 2010). Dr. Dillard recognizes that health outcomes are worse in communities with a broad range of socioeconomic levels such as Forsyth County. Poverty is linked to poorer health outcomes in children and as the nation’s socioeconomic status worsens it can be expected that health outcomes in children, including infant mortality will also decline. Additionally, as the socioeconomic gap widens among Forsyth County residents the gap in infant mortality will widen. Maternal factors such as educational status are closely linked to socioeconomic status and Forsyth County has a small percentage of African Americans with college education.

Per Dr. Dillard, 35% of babies born to African Americans in Forsyth County are born to single mothers compared to 4% of white babies born in the county. Parenting as a single mother increases stress at any socioeconomic level. Dr. Dillard notes “societal expectations that women become superwomen” managing both motherhood and careers effortlessly heightens the stress women experience (R. Dillard, personal communication, January 26, 2010). Dr. Dillard states that for mothers lacking adequate social networks, “becoming pregnant and subsequent motherhood can promote increasing social isolation and loneliness”. Social isolation and loneliness can contribute to depression. Stress during pregnancy may

also lead to chorioamniotitis which may contribute to newborn sepsis, meningitis, or respiratory problems (Cleveland Clinic, n.d.). Nearly 30% of premature births among infants weighing less than 1500 grams in Forsyth County are associated with chorioamniotitis according to Dr. Dillard (R. Dillard, personal communication, January 26, 2010).

Dr. Dillard considers premature births as the “crux” of infant mortality noting that 75% of infant mortality deaths are due to premature birth rate in Forsyth County. Efforts to reduce preterm births must address the broader social issues that contribute to poor maternal health. Dr. Dillard is a proponent of improving both preconception and interconception health (R. Dillard, personal communication, January 26, 2010).

Dr. Mary Lou Moore, PhD, RN, FAAN, Associate Professor of Obstetrics and Gynecology at Wake Forest University School of Medicine, is also an expert in infant mortality within Forsyth County. Dr. Moore co-authored the research study *A Randomized Trial of Nurse Intervention to Reduce Preterm and Low Birth Weight Births* in the 1990s to test the effect of telephone calls from registered nurses to low-income pregnant women on the rates of low birth weight and preterm birth. Although the findings of this study were inconclusive, a secondary analysis of African-American subjects age 19 and older had a significant difference in preterm birth rates (Moore et al., 1998). Dr. Moore reported that the nurses in the study upon closing out contact with study participants heard many comments about the importance of this form of social support during pregnancy. This finding lends support to the importance of community support and education on pregnancy outcomes.

Dr. Mary Lou Moore was interviewed at length regarding the health disparities among infant mortality outcomes in Forsyth County. Dr. Moore cites the recent emphasis on reducing “socially mandated” elective inductions or cesarean sections done during “late

term” (M.L. Moore, personal communication February 16, 2010). Dr. Moore acknowledges that these infants do not die but may be readmitted for health problems associated with early birth. Late preterm infants (formerly known as "near-term" infants) are at increased risk for complications including respiratory distress, hypoglycemia, hypothermia, and jaundice (Stokowski, 2007). Elective births are one of the three key risk factors of premature birth for which the MOD focuses (MOD, 2009).

Dr. Moore discussed the “Hispanic paradox” in infant mortality; wherein Hispanic mothers have better outcomes than other minority groups although they are often poor, have high teen pregnancy rates, and are often inconsistent with prenatal care. Dr. Moore notes the Hispanic population is very family oriented and there is strong maternal support within the culture. Dr. Moore theorizes that there may also be a protective genetic component promoting term deliveries among the Hispanic population (M.L. Moore, personal communication, 2010). The role of genetics in preterm birth is a current focus of experts according to Dr. Moore. Genetics may provide part of the rationale behind the diversity in birth outcomes, yet much research is yet to be done. Literature to date suggests that both socioenvironmental factors and genetics may play a role in preterm delivery. Some evidence of familial and intergenerational influences has been found in the literature for low birth weight and preterm delivery (National Academy of Sciences, 2007).

Deloris Huntley is a founder of Alpha Omega Family Ministries in Winston-Salem, NC and Co-Chair of the FCIMRC. Mrs. Huntley concurs with Dr. Dillard that education is one of the key components in mitigating premature birth and improving birth outcomes. Mrs. Huntley states “poverty, unplanned pregnancies, pre-conception health, smoking, diet, poor social networks, lack of healthy female role models and lack of male role modeling are the

most significant issues among low income African Americans in Forsyth County” (D. Huntley, personal communication, February 16, 2010). Alpha Omega Family Ministries offers health promotion education and parenting classes to women at high risk for poor pregnancy outcomes. Mrs. Huntley states “education in relationship to diet, folic acid consumption, pregnancy planning and pregnancy spacing, and smoking are offered in conjunction with a program geared toward young adolescent girls to improve self-esteem and relationship skills” (D. Huntley, personal communication, February 16, 2010).

Mrs. Huntley has observed that young girls often replicate values and the lifestyle behaviors of their mothers. Many African-American mothers are in their teens when they deliver their first child. Many of these teen mothers do not graduate from high school. The biological father of their babies is seldom a source of support for the pregnancy and care of an infant. Parenting skills are not well defined in this community. Mrs. Huntley states that “the first baby born to an African American mother is met with some measure of social support and anticipation yet subsequent pregnancies are not supported”. The initial support system is weak and breaks down with subsequent babies and the passage of time. Mrs. Huntley notes that “the health of the mother may also deteriorate with rapid rebirthing” (D. Huntley, personal communication, February 16, 2010). Domestic violence is another component of life for many of these low income mothers which in turn increases their stress level. Sexually transmitted diseases often go untreated or ineffectually treated as women with HIV/AIDS fail to take their prescription medications on schedule. Mrs. Huntley recommends interventions to improve the self-esteem of young women and men in the community, strengthen family units in low income neighborhoods, and improve the preconception and interconception health of mothers.

STATE INFANT MORTALITY COLLABORATIVE (SIMC)

Efforts in Forsyth County to address infant mortality are comprehensive and mirror national efforts to address this complex health issue. In September 2004, North Carolina was one of four other states participating in a three year national effort to reduce both the overall infant mortality rate and the racial disparity in infant mortality within the state through the New State Infant Mortality Collaborative (SIM). This collaborative was supported by the CDC, the Association of Maternal and Child Health Professionals, and the MOD in conjunction with other national and state partners. The SIM Collaborative in North Carolina has focused upon examination of qualitative data to complement existing quantitative analysis of infant mortality statewide. The established goal was to understand beliefs and opinions of North Carolinians regarding women's health and infant mortality thereby understanding the current trends in infant mortality and pose solutions (Investigating Troubling Trends: A Report of the AMCHP/CDC State Infant Mortality Collaborative, 2007).

Data gathered from qualitative messages collected from pregnant women was summarized, analyzed and cataloged into five categories in May 2005. The categories included: 1) general health factors with recommendations to improve and simplify access to health services, educate women regarding preventive health in public schools, churches, and communities, 2) lifestyle factors with recommendations to extend health clinic hours for working mothers, mandate a living wage, improve health literacy of educational material, 3) socioeconomic factors with recommendations to involve men/partners throughout pregnancy, provider support groups to deal with relationship issues, pregnancy and motherhood, educate about healthy eating habits, develop alternative activities for drug use and teach time

management skills to alleviate stress, 4) family planning factors with recommendations to educate about birth spacing, discuss birth control options throughout the health system and include women's partners in the discussion, and 5) other factors consisting of customer service issues, patient/provider trust, disconnected systems that serve women such as housing, health, insurance, health care with recommendations that there is an increased availability of affordable and available childcare, eliminate racism, raise community awareness regarding maternal and child health, use media campaigns to promote healthy lifestyles and healthy pregnancies. Further learnings included: diversity in teams and collaboration is vital, attention from the governor's office and ownership by the state legislature of the problem provides the necessary infrastructure and advocacy to maximize results, each state is different and individual approaches are warranted, and lastly, that infant mortality is a complex issue with no simple fix (Investigating Troubling Trends: A Report of the AMCHP/CDC State Infant Mortality Collaborative, 2007).

NATIONAL HEALTHY START PROGRAM

The National Healthy Start Program originated in 1991 and has grown to encompass 96 federally funded Healthy Start programs. The goal of the Healthy Start Program is to change behaviors to improve infant mortality through intense, community level intervention (National Healthy Start Program, n.d.). The Healthy Start Program is administered under five categories of grants: Perinatal Health, Border Health, Interconceptional Care, Perinatal Depression, and Family Violence. The Healthy Start Program utilizes women of the community to educate and empower women. The Healthy Start Program is community driven and most often located in the poorest neighborhoods. Over 90% of Healthy Start

families are of African American, Hispanic, or Native American ethnic origin (National Healthy Start Program, n.d.).

BABY LOVE PROGRAM/BABY LOVE PLUS PROGRAM

The Baby Love Program of North Carolina is comprised of a variety of services to promote healthy babies among women at high risk for poor pregnancy outcomes.

Services are available to eligible pregnant and post partum women that include maternity care coordination, childbirth education classes, counseling, and medical home visits for mother and newborn (North Carolina Department of Health and Human Services, Baby Love, n.d.). The Maternity Coordination Program assists pregnant women and mothers with filing for Medicaid and insurance, referrals to community services for housing, school, transportation and childcare as well as resources to aid mothers when they are feeling stressed. The Baby Love Plus Program is an extension of the Baby Love Program allowing for continuation of services beyond the neonatal period.

GUILFORD COUNTY

Guilford County borders Forsyth County and is similar in demographic composition, population size, and median income. Guilford County, however, has substantially better infant mortality rates among minority populations than Forsyth County. According to the Rural Economic Development Center, Inc. Rural Data Bank, in 2008 Forsyth County had a population of 343,028 comprised of 69% Caucasian and 25% African American. Guilford County's population in 2008 was 472,216 comprised of 64% Caucasian and 29% African American. Physicians per population in Forsyth County were 40.7 compared to 24.1 in

Guilford County. Unemployment rate in Forsyth County in 2008 was 5.8 and 6.2 in Guilford County. Forsyth County ranks high in tobacco dependency ranking and Guilford County ranks as medium. It was found that 15.1% of children lived in poverty in Forsyth County for 2008 and 13.8% of children in Guilford County lived in poverty. Children in Guilford County are more successful in school than those in Forsyth County with greater percentages doing well in school, completing high school and going on to college. The overall infant mortality rate for Guilford County in 2008 was 9.5% compared to 12% in Forsyth County. The African American infant mortality rate in Guilford County was 13% compared to a 7.4% white infant mortality rate. The African American infant mortality rate was 25.3% compared to 6.4% white infant mortality in Forsyth County during 2008. Forsyth County's African American infant mortality is nearly two times higher than neighboring Guilford County. Despite the favorable physician to population ratio and lower unemployment rate in Forsyth County as compared to Guilford County; infant mortality among African Americans is greater in Forsyth County. In Forsyth County, the risk factors of smoking, lower educational attainment, and poverty pose a greater threat to healthy birth outcomes.

Table 3. 2008 County Data Comparison between Forsyth and Guilford Counties

2008 County Data Comparison	Forsyth County	Guilford County
Population	343,028	472,216
% Caucasian	69%	64%
% African American	25%	29%
Infant Mortality Rate	12%	9.5%
Caucasian Infant Mortality Rate	6.4%	7.4%
African American Infant Mortality Rate	25.3%	13%

Data taken from 2008 Rural Economic Development Center, Inc. Rural Data Bank

GUILFORD COUNTY ADOPT-A-MOM PROGRAM

The Guilford County Coalition on Infant Mortality (GCCIM) sponsors the Adopt-A-Mom program which was founded in 1991, and has shown success in securing prenatal care for low to medium risk pregnant women who do not qualify for Medicaid yet lack private insurance or finances for health care (Guilford County, n.d.). The Adopt-A-Mom Program is currently sponsored through the GCCIM by the following sponsors: Moses Cone Wesley Long Community Health Foundation, Smart Start, Joseph M. Bryan Foundation, and the Sisters of Mercy of North Carolina Foundation, Inc. Through the Adopt-A-Mom Program a group of providers within Guilford County have agreed to provide services for this population often at reduced rates (Guilford County, n.d.). This program received national recognition in 2006 by the Monroe E. Trout Foundation and serves as a model for intervention meeting the needs of an underserved segment of our society (Guilford County, n.d.).

RECOMMENDATIONS FOR FORSYTH COUNTY

In conclusion, the issue of infant mortality is complex and has remained largely unchanged for minority populations in the United States despite targeted health interventions. Recent data suggests that the gap between minority infant mortality rates and infant mortality rates for whites is widening. The United States lags far behind comparable industrialized nations in terms of infant mortality which is largely due to the issue of premature births. Technological advances in medicine have resulted in the survival of more preterm and very preterm infants during the birth process thereby increasing the impact of prematurity on our health system and families. Too often these burdens fall upon young, single mothers ill

prepared to shoulder the responsibility of parenthood let alone parenthood involving children with special needs. Furthermore, living in communities that offer little to no support for these challenges also has a detritus impact on society. Over time living under this amount of stress impacts the health of the young mother. In addition, there is some evidence that children born to teenagers are more likely to become mothers themselves in their teen years. How do we disrupt this redundant cycle?

Forsyth County has made significant progress targeting known risk factors for premature birth such as smoking and advocacy for prenatal care through the establishment of a medical home. Additionally, North Carolina recently passed legislation enforcing smoking bans in restaurants and bars; and the risk of congenital defects has been addressed through a partnership with the MOD and the North Carolina Folic Acid Campaign. Programs to increase public awareness regarding the impact of alcohol and other drug use during pregnancy are also available in Forsyth County. Comprehensive programs exist within the county health department and community agencies to address risk factors of unprotected sexual activity, counseling for pregnant women and their partners, parenting classes, and relationship issues. Recently Forsyth County has promoted the use of the drug 17P to enhance the chances for a successful pregnancy outcome for mothers that have suffered miscarriages. Lack of access to healthy fruits and vegetables is being addressed with the Healthy Corner Store Initiative. Plans are in place to reduce barriers to access to medical care with the extension of clinic hours and child care options.

Two thirds of pregnancies in Forsyth County are unplanned (FCIMRC, n.d.). Unplanned pregnancies frequently contribute to poor pregnancy health and outcomes, as critical fetal development takes place in early weeks of gestation before many women

recognize that they are pregnant. Inadequate diets including insufficient amount of folic acid and lifestyle behaviors such as smoking, alcohol consumption and substance abuse in early pregnancy increase risks of prematurity and birth defects (MOD, n.d.). Encouraging women to define a reproductive life plan and the utilization of contraception when pregnancy is not intended promote healthier birth outcomes (Cotton et al., 2009). Reproductive life planning may include: education regarding how to be able to get pregnant when and if desired; how to avoid getting pregnant; how to avoid sexually transmitted diseases; how to prepare for and have a healthy pregnancy when and if desired; how to obtain necessary screenings for disease so as to diagnose and treat disease early; and how to establish and maintain safe and healthy relationships with their parents (Cotton et al., 2009).

PROMOTE INVOLVEMENT OF FATHERS/PARTNERS IN REPRODUCTIVE CYCLE

Deloris Huntley, Co-Chair of the FCIMRC relayed a recurrent theme among African American women in response to her question about what in their past could have been different and improved the course of their lives: a father figure. Parenting is challenging for two parents and even more so for a single mother. Poverty levels and financial stressors are higher amongst single parent homes when the parent is the mother (CDC, 2008). In Forsyth County, one in every three women giving birth is not married (Forsyth County Health Department, n.d.). For single mothers beginning parenthood prior to completing high school, the financial hardships are more extreme and few of these mothers ever continue their education. Increased levels of stress may contribute to preterm labor and low birthweight. People under stress may develop unhealthy coping mechanisms to deal with stress such as over eating, cigarette smoking, alcohol use or skipping meals. Over time these habits have a negative impact on maternal health. A recent study conducted by Essex and Pickett

examining the comparison of women who choose to be unaccompanied or who have no companion available at birth with those who had support during birth concluded that being unaccompanied at birth may be a useful marker of high-risk mothers and infants in need of additional support in the post partum period (Essex & Pickett, 2009).

REDUCE TEEN PREGNANCY

Teenage pregnancies are often unplanned pregnancies and frequently result in poorer birth outcomes. Research by Meade, et al., has shown that daughters of teenage mothers are 66% more likely to become teenage mothers. Individual factors such as school performance, family characteristics (including maternal education, marital status, and number of children), peer factors (dating history) and environmental factors, and race predicted teenage childbearing. Unique risks to daughters of teenage mothers included deviant peer norms, low parental monitoring, Hispanic race, and poverty (Meade, et al., 2008). Pregnancy outcomes are worse among young mothers (MOD, n.d.). For these reasons, strategies aimed at reducing teenage pregnancy in Forsyth County may yield a significant impact on infant mortality.

EXPAND FOCUS OF PRE-CONCEPTION/INTERCONCEPTION CARE

The preconception/interconception advocacy focus in Forsyth County for the next two years is a promising strategy to improve birth outcomes in North Carolina. Many factors contribute to preconception health and it may not be feasible to address them all initially. Nonetheless, consideration of the emotional well being of the expectant mother is as critical as her physical well being and safety. It may not be possible to significantly impact birth outcomes unless improving preconception health results in an increase in the emotional well being of our mothers. Maternal depression has been linked to spontaneous preterm birth. Post

partum depression may impact the care an infant receives. Included in emotional well being are a sense of self, a healthy self esteem, a right of self-determination, and the association of healthy social networks. A sense of self-empowerment including the ability to make informed decisions about health behaviors is limited for many women and especially among younger women, racial minorities, women of lower socioeconomic status, and/or lower educational attainment (North Carolina Healthy Start Organization, n.d.). Programs developed and placed in school systems to eliminate bullying by peers, community programs to improve parenting skills, and access to community mentoring programs may aid children, who are at risk for emotional abuse, in healthy emotional development. Increasing community awareness of signs and symptoms of emotional delay or abuse in children may lead to more effective interventions. Children with a healthy sense of self may be less vulnerable to deviant peer pressure. Emotionally healthy children grow into healthy adolescents who are able to nurture themselves and others.

Jack Shonkoff in his article *The Early Childhood Roots of a Lifetime of Physical and Mental Health* notes that significant stress impairs development in the first three years of life. Research on biological stress has demonstrated how adversity raises heart rate, blood pressure, and stress hormone levels which can in turn alter brain architecture, immune status, metabolic systems, and cardiovascular function (Shonkoff, n.d.). Interventions aimed at reducing significant adversity in early childhood may prove to be part of the solution to a reduction in racial and ethnic health disparities and prove more effective than attempting to change adult behavior associated with poor health (Shonkoff, n.d.). Over time individuals with emotional health will be more resilient to the stress associated with low socioeconomic status and less prone to unhealthy lifestyle behaviors. As these individuals model healthier

lifestyle choices, their children will be less likely to replicate behaviors associated with poor health and increased infant mortality.

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